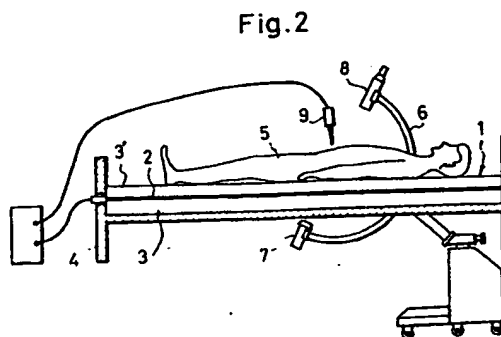
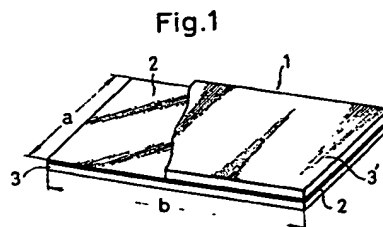


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- (54) Patient plate for electrosurgical unit
- (57) A patient (ground) plate (1) for an

electrosurgical unit comprises a laminate of an electroconductor (2) formed from a thin film of a metal such as aluminium or metal net of fine, flexible mesh and soft sheets of insulator (3, 3') sandwiching said electroconductor, the laminate being formed to the area of an operating table on which the patient (5) will lie and so arranged that a high-frequency current will flow between the cutting edge (9) of the electrosurgical unit and the electroconductor (2) through the entire body of the patient (5). The upper sheet (3') is preferably vinyl chloride having a high dielectric constant, and a lower sheet (3) may be similar but is usually a urethane resin having a higher flexibility. The electroconductor (2) is vapour deposited on one of the sheets (3) of the insulator and then the other sheet (3') of insulator spread over it. The patient plate can be converted into a part of a bed.



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Fig.1

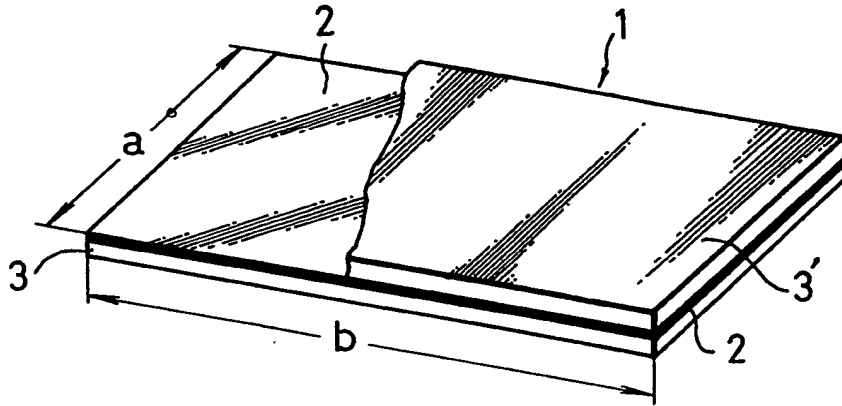
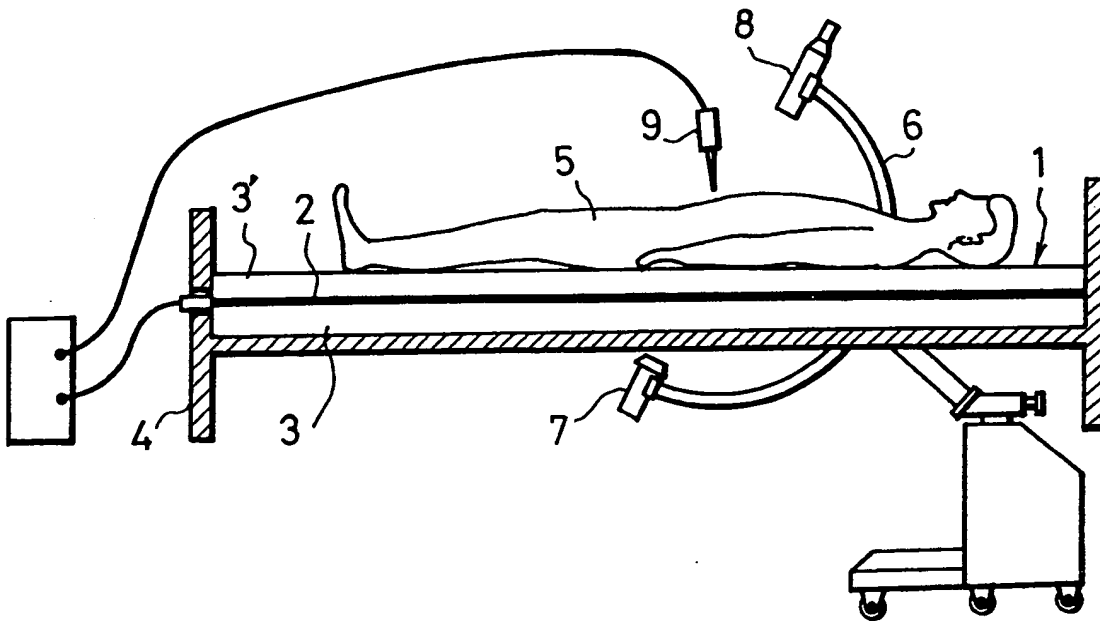


Fig.2



SPECIFICATION

Patient plate for electrosurgical unit

- 5 This invention relates to a patient plate for an electrosurgical unit.

The conventional patient plates for this purpose have been formed from a metal plate of a size that corresponds to the buttocks of the patient, the metal plate being covered with a wet cloth impregnated with a saline solution or coated with an electroconductive gel in a way to ensure sufficient electrical contact between the body of the patient and the plate.

10 This conventional patient plate, however, has involved some serious problems. For example, the contact area between the patient's body and the patient plate is relatively small, so that it might occur that the patient plate will be contacted only partly by the patient's body particularly when the posture of the lying patient is biased to one side. In such a case, the current flowing into the patient plate from the cutting edge is so concentrated at the contacting part as to cause abnormal accumulation of heat in said part and give rise to a serious problem such as a burn on the patient's body. In particular, the patient, when under anesthesia for an operation, might sustain a serious injury as he cannot complain of the pain under such condition. Also, because of the relatively small contact area of the patient plate as stated above, care is required when attaching the plate to the patient's body. In addition, the plate must be separated from the patient's body after the operation.

- 15 The object of the invention is to overcome these problems.

According to the present invention a patient plate for an electrosurgical unit comprises a laminate formed from an electro-conductor sandwiched between soft sheets of insulator over the total area of the electro-conductor and being formed to the area of an operating table on which a patient will lie, thus being arranged so that a high-frequency current can flow between the cutting edge of the electrosurgical unit and the electroconductor through the entire body of the patient. The invention eliminates any possibility of causing a burn on the patient's body due to concentration of the electric current at a limited part, and because the plate is composed of an electroconductor between soft insulator sheets, the metal surface is not directly contacted by the patient's body thus avoiding patient discomfort caused by direct contact with the hard metal surface. An operation can be performed by applying a high-frequency current between the cutting edge of the electrosurgical unit and the electroconductor, and further, after the operation, by merely turning off the switch of an electrosurgical unit, the patient plate can be immediately converted into a part of a bed.

The electroconductor used in this invention is preferably a thin film of a metal such as aluminium or metal net of flexible fine mesh vapour deposited on one of the sheets of insulator.

- 20 At least one of the sheets of insulator, which forms

the upper portion of the patient plate and with which the patient's body contacts, is preferably formed from a vinyl chloride plate having a high dielectric constant. The other (or lower) sheet of insulator may be a vinyl chloride plate, but usually a material having a higher flexibility such as urethane resin is used. Because the patient plate is formed to correspond to the size of an operating table it can be incorporated in a bed on which the patient lies and can be used in that state.

25 Since this type of electrosurgical unit is usually used under conditions in which the operation is televised by an X-ray television for surgical operations, it is required that the fluoroscopic image should not be disturbed by the patient plate. This danger is eliminated when a metallic thin film or a metal net is used as the electroconductor, so that a clear image is always presented to the operator. In this case, the material for the insulator does not disturb X-ray images. Thus, a patient plate according to the invention can be used while incorporated in the patient's bed, and if necessary, an X-ray television unit may be adapted for use therewith. The impedance between the patient and the patient plate is lower than with a conventional patient plate, because the size is very considerably larger (more than ten times) than the conventional one. It also means, if this type of patient plate is used with an electrosurgical unit or other medical engineering instruments, the radio-frequency of real current through the electrosurgical unit or through other instruments which are directly attached to a patient's body is reduced. In other words, the likelihood of causing a burn in this area is also less than under the conditions using a conventional patient plate. Additionally, a patient plate in accordance with the invention can use high dielectric material for its insulator sheets and can be thick enough so as not to be easily damaged, and so it can be used again and again.

An embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawings, in which:-

Figure 1 is a partly cutaway perspective view of a patient plate for an electrosurgical unit according to this invention; and

Figure 2 is a diagrammatic part-sectional side elevation illustrating a mode of use of the device according to this invention.

30 The patient plate 1 shown in the drawings is composed of an electroconductor 2 and two sheets of insulator 3, 3' between which the electro conductor is sandwiched. For example, an aluminium thin film is vapour deposited over the entire surface of one side of the insulator sheet 3, and the other sheet of insulator 3' is spread over the thin film 2 to form a laminate. Flexible electroconductive plastic and other similar materials may be alternatively used as the electroconductor 2.

35 Various kinds of vapour depositable metals such as aluminium, copper, etc., may be used for forming the metallic thin film, but aluminium is preferred. Also, a variety of materials such as flexible rubber, plastics, asbestos, etc., may be used as the insulator sheet on which the metallic thin film is to be

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evaporated, but vinyl chloride resin having a high dielectric constant is preferred.

Since a high-frequency electric current is applied to the electrosurgical unit according to this invention, the laminate is so arranged that an electric current may be passed between the cutting edge and the electroconductor through the insulator sheet 3.

The width *a* and length *b* of the device of this invention are predetermined so that the device can serve as an operating table which is conveniently incorporated in the bed which the patient uses.

The patient plate 1 is incorporated in a bed 4 so as to be serviceable as the operating table as shown in Figure 2, whereby the area of the plate contacting the patient 5 is strikingly enlarged compared with a conventional patient plate and the high-frequency current applied between the cutting edge 9 of the electrosurgical unit and the electroconductor 2 through insulator 3 passes through almost the entire body of the patient 5, thus eliminating any possibility of causing a burn or other problem due to concentration of the electric current.

Also, since the sheet-like insulators 3, 3' are soft members, the patient lying thereon has no sense of incompatibility and the device can be laid out in the same manner as an ordinary mattress, so that there is no need to remove it after the operation, and it can be kept spread on the bed. In the case where a metallic thin film is used, even if an X-ray tube 7 and a fluorescent multiplier tube 8 secured at the ends of a C-shaped arm 6 are placed in opposed relation with the patient plate 1 being disposed therebetween, there is no impediment to the obtaining of a fluoroscopic image of the patient and the operation can be performed effectively. Furthermore, the operator is freed from the trouble of constantly watching and/or adjusting the contact condition of the patient, for example, checking the condition of gauze, etc., impregnated with a saline solution, or the spread of an electroconductive gel as required in the case of the conventional patient plates, and hence the handling of the electrosurgical unit is greatly facilitated. Thus, the device of this invention is of high practical value.

CLAIMS

1. A patient plate for an electrosurgical unit comprising a laminate formed from an electroconductor sandwiched between soft sheets of insulator over the total area of the electroconductor and being formed to an area of an operating table on which a patient will lie, thus being arranged so that a high-frequency current can flow between the cutting edge of the electrosurgical unit and the electroconductor through the entire body of the patient.

2. A patient plate as in Claim 1, wherein the electroconductor is a metallic thin film vapour deposited on one sheet of insulator.

3. A patient plate as in Claim 1, wherein the electroconductor is a metal net of flexible, fine mesh vapour deposited on one sheet of insulator.

4. A patient plate as in Claim 2, wherein the metallic thin film is of aluminium.

5. A patient plate as in Claim 1, wherein a vinyl

chloride plate having a high dielectric constant is used for forming at least one of the sheets of insulator.

6. A patient plate as in Claim 5, wherein the other sheet of insulator is formed from a vinyl chloride plate.

7. A patient plate as in Claim 5, wherein urethane resin is used to form the other sheet of insulator.

8. A patient plate as in any one of the preceding Claims, wherein said plate is adapted to serve as an operating table incorporated in a bed on which a patient will lie.

9. A patient plate for an electrosurgical unit substantially as hereinbefore described with reference to the accompanying drawings.

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